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ABSTRACT

An in-depth investigation of the inner components of cooperative learning methodologies was made, concentrating on five basic research questions. These were: (1) Do teacher's focusing questions and interaction with students during cooperative learning facilitate students' critical thinking skills? (2) In what ways do cooperative learning groups affect students' leadership roles and communication patterns? (3) What is the nature of student-to-student interaction during individual task assignments? (4) In what ways do cooperative learning skills affect subsequent work behaviors during non-cooperative learning time? (5) In what ways does a cooperative learning environment affect students' behavior? Subjects were a class of fifth-grade public school students who were placed into heterogeneous cooperative learning groups based on the variables of student leadership tendencies, academic achievement, and ethnicity. Four social studies learning modules that used the Group Investigation model of cooperative learning were implemented. This methodology and subject area were chosen on the basis of the class's previous successful experiences with this model in the social studies area. Follow-up research was conducted the following year when the subjects were in the sixth grade. Data were collected through videotaping, student profiles of three at-risk children, students' journals, a student work preference questionnaire, and matrices on leadership, communication, and student work behavior. Findings are discussed and recommendations are offered. Citations number 39. (RH)

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RESPONSES TO COOPERATIVE LEARNING PROCESSES AMONG ELEMENTARY-AGE STUDENTS

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Cooperative learning, and its varied strategies, has fast become one of the most prominent methodologies of teaching throughout the country. Researchers who have studied the methodology in-depth have continually proclaimed its numerous virtues. (Aronson *et. al.*, 1978; Dewey, 1933; Johnson and Johnson, 1986a; Joyce *et. al.*, 1987; Sharan *et. al.*, 1984; Slavin, 1989a; Thelen, 1954) However, research in the strategy has been thus far limited to the results and effects of cooperative learning sessions and not to an examination of the processes involved in the model. This becomes an important issue when one considers the inhibitions of the average, everyday classroom teacher towards grouping variation and changes in the classroom management style that he or she is comfortable with (Lemlech, 1990). Taking these inhibitions into account, it would seem impractical to expect teachers to radically change their classroom environment in order to implement one of the many cooperative learning models available today. It may be more practical to get these teachers to use and adapt various successful components of the cooperative learning methodology--components arising from a study of what actually occurs during the interactions of a cooperative learning lesson. Unfortunately, this is an area which has not yet been adequately researched.

This problem has been stressed by Robert Slavin, who has conducted detailed analyses of studies of cooperative learning. He states that "research conducted to date has dealt primarily with validation of the various cooperative learning models...these have focused primarily on achievement outcomes. There is a need both for careful analysis of what goes on in a cooperative classroom, and for more attention to just how the various outcomes come about." (1983, p. 119)

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In order to deal with this shortcoming perceived by Slavin a study was conducted consisting of an in-depth investigation of the inner components of cooperative learning methodologies.

OVERVIEW OF THE STUDY

This study focused on the thinking and interactive processes of children during cooperative learning. In particular, the investigator studied the interactions between teacher and student, student and student, and student and material. Also observed were various student characteristics that may affect the cooperative learning process.

The study concentrated on five basic research questions

1. Do teacher's focusing questions and interaction with students during cooperative learning time facilitate critical thinking skills?

2. In what ways do cooperative learning groups affect students' leadership roles? Communication patterns?

3. During individual task assignments, what is the nature of student-to-student interaction?

4. In what ways do cooperative learning skills affect subsequent work behaviors during non-cooperative learning time?

5. In what ways does cooperative learning environment affect students' behavior?

BACKGROUND OF THE PROBLEM

The vast majority of small group research has been conducted in the business community, studying the interactions of adults operating in small groups. (see Beebe and Masterson, 1982; Bunker and Dalton, 1976; Hare, 1976; Johnson and Johnson,

1982; Lorsch and Sheldon, 1976) Both the business research and that conducted in the educational field have showed that small groups were very effective for obtaining certain goals (see Commons, 1982; Lemlech, 1977, 1990; Sharan and Sharan, 1976; Thelen, 1954) . Both areas of research found that there were various factors that affected this effectiveness--social interactions, personalities, member roles, communication patterns, leadership--and that these factors were applicable in both business and educational small groups. However, when one looks at how these individual factors operate and affect small groups, the research is very limited in the educational literature.

Another problem is that the majority of the research was conducted with high school students, who have a different level of sophistication than do elementary students. Almost all of the data results have been quantitative rather than qualitative--much was told of the effects of small groups, little of the variables causing the group to reach those effects. Although researchers have stressed how social interactions affect the working of small groups, these areas have not been adequately studied in an elementary setting.

Virtually all researchers agree that cooperative learning has produced significant effects in both cognitive and non-cognitive areas over control groups. (Sharan *et al.*, 1984; Sharan and Sharan, 1989; Slavin 1983, 1987a, 1989a; Slavin, Karweil and Madden, 1989). However, a number of problems have recently come to light during the analyzation of cooperative learning research and implementation. Three major problems are:

1. The vast majority of all of the research conducted to date has involved specific cooperative learning models, in their original form, with teachers especially trained in that particular model. Such is not the situation found in most schools using cooperative learning.

2. In implementation, it has been found that a great many teachers are not sufficiently trained in cooperative learning strategies, and that the teachers are often misunderstanding, or misusing, the methodology. (Johnson and Johnson., 1987; Sapon-Shevin and Schniedemind, 1989; Sharan and Sharan, 1987; Slavin, 1989b)

3. The research has almost exclusively focused on the effects of the models, not on the interactions which occur during their use. This includes a lack of research into the factors listed above which were found to be relevant to the effectiveness of small groups.

There are other important aspects of cooperative learning implementation which have not been adequately addressed. One important aspect is the promotion of critical thinking in students that is found in the strategy. Although researchers have varying opinions and definitions as to what constitutes critical thinking (see Common, 1982; Grant, 1988; Maimon, 1989), most agree that the teacher plays a crucial and central role in its development in students. (Clark and Peterson, 1986; Feuerstein, 1980; Fusco, 1985; Grant, 1988).

Unfortunately, most of the research concerning critical thinking is either highly generic and general, or it is highly specialized to cover one particular instance or situation. In addition, although researchers sited above have claimed that critical thinking is of utmost importance for successful cooperative learning, there has been virtually no research conducted on the forms of critical thinking that occur within small groups, during teacher-student interaction, or on critical thinking in elementary settings.

As one can conclude, there has been a need for research into responses to cooperative learning processes among elementary-age students. It was to address this void that this study was developed.

SETTING OF THE STUDY

The population of study was a class of fifth-grade public school students. The students were placed into heterogeneous cooperative learning groups based on the variables of student leadership tendencies, academic achievement, and ethnicity. In addition, follow-up research was conducted the following year in the researcher's sixth grade classroom with students who were the main subject of the study the previous year.

The context of the study involved four modules using the Group Investigation model of cooperative learning. All four of these modules primarily fit within the Social Studies section of the classroom curriculum. This methodology and subject area were chosen as the class had previous successful experiences working with this model in this subject area. In this fashion, the data to be accumulated would not be skewed based on student unfamiliarity or potential adverse reactions to a new educational situation.

As suggested by the research on the participant-observation method, the researcher also served as the teacher of this class. (Gold, 1969; Rogers, 1984)

INSTRUMENTATION

In developing a strategy for this research, one which could truly allow the researcher to get inside cooperative learning processes, the qualitative research methodology of participant-observation proved to be a valid and useful tool to use; one which would provide the descriptive data necessary to answer the questions as they have been presented. (Babbie, 1989; Erickson, 1986; Gold, 1969; Jacob, 1988; Rogers, 1984; Wittrock, 1986; Wolcott, 1982)

The instrumentation selected for this study involved a triangulation of methods, each selected and/or developed with the goal of providing a rich description of the cooperative learning experience. The following instruments/methodologies were incorporated:

1. Videotaping--All four modules were videotaped in their entirety, providing approximately twenty-five hours of data, over a period of three months. The first two modules were used to test and refine the various matrixes and to enable the students to become totally "at-ease" to the videotaping process. The third and fourth modules were used as the main source of data for question one-four above. All of the video-taped data were categorized into six different and distinct areas of classroom interaction: directed lesson, teacher/class discussion, teacher/group interaction, group discussion, individual work, debriefing session. These categorized sections were then used as the specific data bases for the individual research questions listed above.

2. Leadership Matrix--This matrix was adapted from the business world (Driver, 1989) and used to show the various leadership roles that the students took during discussion and individual work time. Variables on the matrix included instances of the following behaviors: task leadership, intellectual leadership, social/emotional (positive) leadership, coercive (negative) leadership, off-task behavior.

3. Who-to-Whom Matrix--This matrix was adapted from the business world (Driver, 1989) and used to show communication patterns among members of the group. The matrix showed all instances of communication and the frequencies in which each student initiated conversation with every other student.

4. Student Work Behavior Matrix--This matrix was developed by the researcher to show student work behavior and interactions occurring throughout individual work time during non-cooperative learning periods. Students were rated by the amount of interaction they initiated (works by self, works with person sitting next to him/her, changes seat to work with someone), the subject matter of the work (whether or not the

two worked on the same subject and/or assignment) and the variety of people he or she worked with (how many different people did the student work with).

5. Student Work Preference Questionnaire--This questionnaire was developed by the researcher to determine how cooperatively students preferred to work during various types of "real-life" classroom individual work periods and assignments. Students were given a number of real classroom situations they were familiar with and asked to tell if, in that situation, they preferred to work alone, with one other person, with two other people, or in a group of three or more.

6. Student Profiles--Three case studies provided descriptions of how three "at-risk" students, who were performing below the classroom norm, fared during cooperative learning modules and throughout their interaction with their classmates.

7. Student Journals--These confidential, private journals provided anecdotal records. They were kept by the students and pertained to their feelings, thoughts, and experiences during the cooperative learning modules. These were used as a data base for the student profiles.

The data were analyzed in a variety of ways. For Question 1, Bloom's Taxonomy (Bloom, 1956) was incorporated to determine cognitive levels of both teacher questioning and interaction levels and the subsequent student critical thinking levels. Each of the other matrixes used specific analytic techniques specifically geared to their unique data base. The qualitative analytic techniques were coordinated through the use of a configuration of the Qualitative Data Documentation Form developed by Miles and Huberman (1984). These qualitative analysis techniques included: determining directional influence, establishing central tendencies, conceptual/theoretical coherence, counting frequencies, establishing factors, seeing a Gestalt, making inferences, establishing intervening/linking conditions, seeing a logical chain of evidence, establishing relationships between

variables/sets of variables, and establishing variance/differences (contrasts, comparisons).

FINDINGS

1. Teacher focusing questions and interaction with students and subsequent student critical thinking levels.

The data indicated a direct, positive correlation between the level of the teacher's focusing questions and interaction with the cooperative learning group and the subsequent critical thinking level of the students in that group (see Table 1). This

Table 1

Summary of the Effects of Teacher Focusing Questions and Interactions with Students and the Subsequent Student Critical Thinking Levels

Module	No. Teacher Interactions	No. Times Subsequent Student Critical Thinking Level Matched that of Teacher
Module 3, Day 3	2	2
Module 4, Day 1	2	2
Module 4, Day 2	6	6

occurred in ten of ten teacher/student interactions. The data involved instances of four of the six levels of Bloom's Taxonomy: knowledge, comprehension, analysis, and evaluation. Examples of the application and synthesis levels were not evidenced during the videotape sessions analyzed.

2. Leadership roles and communication patterns of the students during cooperative learning group discussion, cooperative learning individual work time, and non-cooperative learning individual work time.

The specific students studied showed a great deal of consistency in their leadership roles and communication patterns. This was true throughout the various learning situations (see Table 2). These data indicated that a student with leadership, cooperative tendencies showed those same personality traits whether he or she was working in a cooperative learning group or in non-cooperative learning situations. The same consistency throughout various learning situations also held true for students who would be considered followers, or those who preferred to work alone.

Table 2

Leadership Roles and Work Styles Exhibited by the Various Students in this Study

Student	Coop. Learning Group Discussion Periods	Coop. Learning Individual Work Periods[a]	Non-Coop. Learning Individual Work Periods[b]
Arturo	Non-participant[c]	Low interaction[d]	(not studied)
Irene	Leader	High Interaction	High interaction
James	Follower	Low interaction	High interaction
Mariano	Non-participant	Low interaction	(not studied)
Melissa	Leader	High interaction	High interaction
Phyllis	Follower	Low interaction	Moderate interaction
Peter	Leader	High interaction	High interaction
Bo	Non-participant	Low interaction	No interaction

a. Under these conditions, may work only with those in group

b. Under these conditions, may work with anyone in class

c. "Leader" means one who took a primary role in the operation of the group in at least one area of the leadership matrix. "Follower" means one who took a secondary, but a participatory role, in at least one area of the matrix. "Non-participant" means that although the student was a member of the group, he showed no participation in the group process outside of doing his own, personal task

d. High interaction--High frequency of interactions (ave. 2/min.) in all of the leadership categories combined, other than off-task; Moderate interaction--Moderate frequency (ave. 1/min); Low interaction--low frequency (ave. less than 1/min.)

These data also showed that the leaders took a variety of leadership roles within the group; one person was not found taking only one particular role time after time (see Table 3). However, in every situation, all leadership roles were filled only by those analyzed as leaders; non-leaders never took leadership roles in any situation.

Table 3

Different Leadership Roles Taken by Individuals Within the Groups

Module	Session	Task Leader	Intellectual Leader	Social Leader (Pos/Neg)
Mod 3	Group Disc	Irene	Melissa	Melissa
Mod 4a	Group Disc	Melissa	Peter	Peter
Mod 4b	Group Disc	Melissa	Peter	Peter
Mod 3	Indiv Work	Melissa/Irene	Melissa/Irene	Melissa/Irene
Mod. 4	Indiv Work	Melissa	Peter	Melissa

The communication patterns exhibited by the students indicated the same consistent patterns (frequency and direction of communication connection). This was the case regardless of where the person was sitting (next-to, across from, or diagonally). The following behaviors were determined from the data (using the terms fro Table 2):

Non-Participants--no communication connections with anyone in the group

Followers--low or moderate communication connection with leaders in the group; no connection with each other, even if sitting next to each other

Leaders--high communication connections with each other; varying amounts with other members of the group

3. Cooperative learning and student behavior.

The student profiles of the three students seemed to indicate that cooperative learning can affect the classroom behavior of students, especially in aspects involving group dynamics. In all three cases, the videotapes showed that students in the groups were publicly upset that one of these "problem" students was assigned to their group. These students were perceived as those who normally did less that average work, or who showed less than average cooperation or effort. The group anticipated that these students would lower their grade. Subsequently, these three students were given meaningless tasks, or no tasks at all, to complete within their individual groups. As a result, the three students either failed to cooperate or openly misbehaved.

During debriefing, members of the groups complained about this lack of cooperation. It was then discovered that the major fault lied within the groups themselves for not treating the three as full group members. When this situation was rectified, all three "problem" students began to work at a level equal to the others in their group. This change was publicly commented on by the same members of the

group that had originally complained about the students. This change of attitude was expressed not only during subsequent debriefing sessions, but also through the private student journals.

CONCLUSIONS

Based on the data findings, the following conclusions have been made:

1. There is a direct correlation between teacher's focusing questions and interaction with students during cooperative learning time and subsequent student critical thinking behaviors. In every instance of teacher/student interaction studied, the teacher's questions affected students' output.

2. It is not so much that cooperative learning groups affect students' leadership roles and communication patterns, but rather, student leadership styles and subsequent communication patterns affect cooperative learning groups. Students who appear to have leadership-based personality styles assume all of the leadership roles and control the basic leadership and communication patterns within the group. Students who are basically "followers" in personality style show the same passive tendencies within the cooperative learning group. Those who do not like to participate in groups, who have more of a "loner" personality style, do not take any leadership roles and limit their participation within the group.

3. During individual task assignments, the nature of student-to-student interaction is the same as described in number two above; the interactions that students show among themselves directly correlate with their leadership style.

4. The same students who show cooperative personality traits in cooperative learning also show the same personality traits when given any opportunity to work cooperatively. Cooperative learning, *per se*, did not appear to cause the cooperative working behavior in these students.

5. A cooperative learning environment affects students' behavior to the extent that a student is able to function at the level expected of him (i.e. the self-fulfilling prophesy). When a student is expected to do below-average work (and treated as such), he does so. When he is expected, and treated, as a full member of the group, his work, cooperation, and behavior rises to the higher level expected.

RECOMMENDATIONS

Based on the findings and conclusions, the following recommendations are made:

1. a. More attention needs to be placed on the development of teacher questioning and interactions with students during cooperative learning sessions. Although cooperative learning readily allows for higher level cognitive skills, the research showed that the students need to be brought to those levels by the teacher in order for the students to operate at those higher cognitive levels.

b. Monitoring and feedback for students is as important during cooperative group processes as it is during other teaching strategies. Teachers need to be on-task during cooperative learning.

2. When formulating cooperative learning groups, teachers need to be aware of the personality styles of the individual students. For a group to operate successfully, one needs to establish a heterogeneous make-up of leadership styles as well as abilities.

3. The practice of rotating group "jobs" among members (i.e., leader, "task-keeper") needs to be considered carefully by the teacher. To prevent a student with a leadership-seeking personality from being a group leader could possibly have negative results on the group; to force a "loner" student personality to be the group leader may also have negative results. The best option may be to let the group

determine its own leadership through group processes and use a form of task-differentiation to ensure participation of everyone in the group.

4. Since not all students are comfortable working cooperatively, teachers need to use a variety of models and types of evaluation when presenting a unit. A cooperative learning model should be but one tool among many.

5. Unlike much of today's development of cooperative learning models, teachers should adapt cooperative learning to the subject matter, not the subject matter to cooperative learning. Students who enjoy working cooperatively preferred to work as such during long-term subjective-style projects, not during short-term objective-style assignments.

6. When students negatively relate to a particular student, the entire group process needs to be attended to, not just that particular student's behavior. Debriefing sessions, such as those used during the Group Investigation model, can be used for all cooperative learning experiences. These sessions are excellent for bringing out, discussing, and rectifying group process problems.

7. Additional research needs to be undertaken in the following areas:

a. Teacher questioning during cooperative learning.

b. The identification of student personality styles.

c. The group process of cooperative learning, versus the product of the methodology. An emphasis needs to be placed on the individual properties of cooperative learning that can be transferred to other teaching situations and models, as this methodology increases in popularity.

d. Teacher in-service needs development in the area of using cooperative learning in conjunction with other teaching models.

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